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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/757,193

01/14/2004

Shunpei Yamazaki

0553-0394

3577

7590 10/18/2007
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EXAMINER

RAYMOND, BRITTANY L

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

10/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/757,193	Applicant(s) YAMAZAKI ET AL.	
	Examiner Brittany Raymond	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 19, 20, 23, 24, 27, 28, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (U.S. Patent Publication 2002/0197565) in view of Speakman (U.S. Patent 6713389) and Aoki (U.S. Patent Publication 2005/0237350).

Wu discloses a method of patterning a photoresist-covered substrate comprising: providing a photomask with a first and second region, performing a first exposure to expose a first and second region of the substrate with the first and second regions of the photomask in order to form first resist patterns, performing a second exposure to expose a second and third region of the substrate with the first and second regions of the photomask, and developing the photoresist layer (Paragraphs 0020-0023), as recited in claims 19, 23, 27 and 31 of the present invention. It is apparent from Figure

Art Unit: 1795

12 that the second mask pattern is exposed over the first resist pattern to form second resist patterns, as recited in claims 19, 23, 27 and 31 of the present invention. Wu also discloses that during exposure, areas of the photoresist will be exposed and other areas will not be exposed to light, and during development, depending on the type of photoresist used, either the exposed or unexposed areas will be removed (Paragraph 0006), as recited in claims 19, 23, 27 and 31 of the present invention.

Wu fails to disclose that the first resist patterns are created by ink jetting the resist onto the substrate under reduced pressure, that the pressure is in the range of 1×10^2 Pa to 2×10^4 Pa, and that the viscosity of the resist composition is at most 100 cp.

Speakman discloses a method of forming a patterned electronic device using drop on demand printing (ink jetting) to deposit droplets of a conductive material onto a substrate. Speakman also discloses that the conductive material may be dispensed in a vacuum so that the droplets are the correct size (Column 40, Lines 10-14), as recited in claims 19, 23, 27 and 31 of the present invention. Speakman states that the pressure during deposition of the material is between 1.01×10^5 and 1×10^{-6} Pa (Column 4, Lines 14-15), which falls within the range recited in claims 27 and 31 of the present invention. Speakman also states that the viscosity of the composition is 1 to 200 cp (Column 4, Line 16), which falls within the range recited in claims 20, 24, 28 and 32 of the present invention.

Aoki discloses in the background that an inkjet image forming apparatus can be used to eject droplets of liquid resists (Paragraph 0002), which would form a layer of a resist pattern, as recited in claims 19, 23, 27 and 31 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have used the ink jet image forming process to form a first resist pattern, as suggested by Speakman and Aoki, in the process of Wu, because Speakman and Aoki teach that ink jet printing can form a resist pattern quickly without the use of a photolithography process. It also would have been obvious to one of ordinary skill in the art to have performed the ink jetting process under reduced pressure, such as in the range suggested by Speakman, in the process of Wu because Speakman teaches that the reduced pressure prevents the droplets from being distorted during deposition on the substrate. Finally, it would have been obvious to one of ordinary skill in the art, to have used a composition with a viscosity in the range of 1 to 200 cp, as suggested by Speakman, in the process of Wu because Speakman teaches that this is necessary in order for the droplets to be formed accurately.

3. Claims 22, 26, 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (U.S. Patent Publication 2002/0197565) in view of Speakman (U.S. Patent 6713389) and Aoki (U.S. Patent Publication 2005/0237350), as applied to claims 19, 23, 27 and 31 above, and further in view of Yamaguchi (U.S. Patent Publication 2006/0263722).

The teachings of Wu, Speakman and Aoki have been discussed in paragraph 2 above.

Wu, Speakman and Aoki fail to disclose that the wavelength of light used is in the range of 350 to 450 nm.

Yamaguchi discloses a process of forming a photoresist pattern comprising the use of a photoresist with a viscosity of 1 to 10 cp. Yamaguchi also discloses that a laser with a wavelength of 200 to 500 nm is used for the exposure step (Paragraph 0097), as recited in claims 22, 26, 30 and 34 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have used an exposure light with a wavelength between 200 and 500 nm, as suggested by Yamaguchi, in the process of Wu, Speakman and Aoki because Yamaguchi teaches that this type of light is used with photoresists with low viscosities, such as the compositions used by Wu, Speakman and Aoki.

4. Claims 21, 25, 29 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (U.S. Patent Publication 2002/0197565) in view of Speakman (U.S. Patent 6713389) and Aoki (U.S. Patent Publication 2005/0237350), as applied to claims 19, 23, 27 and 31 above, and further in view of Bibl (U.S. Patent Publication 2006/0007271).

The teachings of Wu, Speakman and Aoki have been discussed in paragraph 2 above.

Wu, Speakman and Aoki fail to disclose that the amount of composition that is discharged at a time is in the range of 10 pl to 70 pl.

Bibl discloses a description of printheads that are used in ink jet printers. Bibl discloses in the background that high performance printheads provide drop sizes of about 1 to 70 picoliters (pl) or less (Paragraph 0002), which is within the range of claims 21, 25, 29 and 33 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have discharged the composition in the range of 1 to 70 pl at a time, as suggested by Bibl, in the process of Wu, Speakman and Aoki because Bibl teaches that typical ink jet printers discharge small ink droplets.

5. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (U.S. Patent Publication 2002/0197565) in view of Speakman (U.S. Patent 6713389) and Aoki (U.S. Patent Publication 2005/0237350), as applied to claims 19, 23, 27 and 31 above, and further in view of Park (U.S. Patent Application 2003/0202132).

The teachings of Wu, Speakman and Aoki have been discussed in paragraph 2 above. Wu also discloses that the substrate can include dielectric layers under the photoresist, which are etched after forming the photoresist pattern (Paragraph 0005). Speakman states that the conductive composition has to be mixed in a solvent in order to be ink jet printed onto the substrate (Column 2, Lines 30-34), which would mean that the photosensitive composition of Wu would have to be mixed in a solvent in order for ink jet printing to occur, as recited in claim 14 of the present invention. Finally, Wu states that the invention is used to make integrated circuits (Paragraph 0004), which are used in devices such as those recited in claim 15 of the present invention.

Wu, Speakman and Aoki fail to disclose the steps of the method recited in claims 13-15 of the present invention.

Park discloses a method of manufacturing a liquid crystal display device which include the steps of: depositing a first metal layer onto a substrate, patterning the metal layer to form a gate line with a gate electrode, placing an insulating layer over the gate

Art Unit: 1795

electrode, depositing an amorphous silicon layer over the gate insulating layer, patterning the amorphous silicon layer to form a semiconductor island, depositing a second metal layer onto the semiconductor island, patterning the second metal layer to form a source electrode, forming a passivation film over the surface of the substrate, depositing a conductive layer on the passivation film, applying a negative photoresist onto the conductive layer, exposing the resist using a mask, patterning the conductive layer to form a pixel electrode, and baking the material to remove unwanted resist (Claim 1), all of which are recited in claim 13 of the present invention. The steps of patterning use a step-and-repeat exposure technique, which comprises front-side exposure (Paragraph 0057) of the substrate. The patterning steps are also recited in claim 13 of the present invention. Park states that only one of each type of electrode is formed. However, it would have been obvious to one of ordinary skill in the art at the time of invention to have repeated the process to form the desired device with the desired number of conductive layers to form a functional device. Finally, Park is teaching a method for manufacturing a liquid crystal display device, which is recited in claim 15 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have used the process of Wu, Speakman and Aoki to pattern source and gate electrodes, as suggested by Park, because Wu discloses a process of patterning a substrate using a photoresist to make circuit patterns, and electrodes are common components of circuit patterns. The process of Wu, Speakman and Aoki also

Art Unit: 1795

makes it easier to perform each photoresist pattern forming step of Park so that the overall process is more efficient.

6. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (U.S. Patent Publication 2002/0197565), Speakman (U.S. Patent 6713389), Aoki (U.S. Patent Publication 2005/0237350) and Park (U.S. Patent Application 2003/0202132) as applied to claims 13-15, 19, 23, 27 and 31 above, and further in view of Hagino (U.S. Patent 5380670).

The teachings of Wu, Speakman, Aoki and Park have been discussed in paragraphs 2 and 5 above.

Wu, Speakman, Aoki and Park fail to disclose that channel protective layers are formed on the semiconductor islands and that a plurality of second semiconductor islands are formed over the channel protective layers.

Hagino discloses a method for fabricating a semiconductor device comprising forming a plurality of semiconductor islands on a top surface of a first part of a semiconductor layer (Claim 5) and forming a second plurality of semiconductor islands on the top surface of a second part of a semiconductor layer, wherein the second plurality of semiconductor islands are aligned with the first plurality of semiconductor islands (Claim 6) and a semiconductor layer being placed between the two types of islands, as recited in claim 16 of the present invention, which can be used as a protective layer.

Wu and Speakman teach every limitation of dependent claims 17 and 18 in paragraph 5 above.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have modified the process of manufacturing a crystal display device of Park, Wu, Speakman and Aoki by forming a plurality of second semiconductor islands on top of the first semiconductor islands, with protective layers in between, as suggested by Hagino because Hagino teaches that this is a common technique in the fabrication of semiconductor devices and semiconductor islands are common components formed on semiconductor devices.

Response to Arguments

7. Applicant's arguments, filed 8/30/2007, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art references.

Applicant argues that the prior art references used in the last Office Action do not teach that the photoresist pattern is deposited under reduced pressure. The reference, Speakman has been added to teach the use of ink jet printing under reduced pressure. Speakman does not teach that a photosensitive composition is being used in the ink jet printing method, however Aoki is used to teach that this type of composition can also be used in ink jet printing.

Applicant argues that the prior art references used in the last Office Action do not teach that a first and second portion are formed during the exposure of the photoresist, and that one portion is removed during development. Wu teaches that during exposure

of a photoresist layer, one portion is exposed and the other is not, and that during exposure, depending on the type of photoresist used, one portion will be removed.

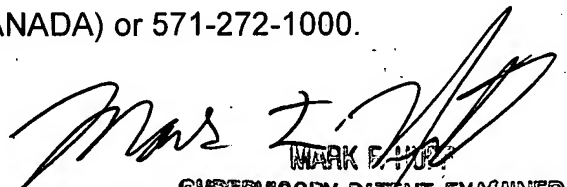
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brittany Raymond whose telephone number is 571-272-6545. The examiner can normally be reached on Monday through Friday, 8:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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